Montana State Library
3 0864 1004 6983 5

STATE DOCUMENTS

NINETEENTH ANNUAL REPORT

YELLOWSTONE RIVER

COMPACT COMMISSION

1970

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601

YELLOWSTONE RIVER COMPACT COMMISSION

421 Federal Building
Helena, Montana

December 24, 1970

Honorable Stanley K. Hathaway
Governor of the State of Wyoming
Cheyenne, Wyoming

Honorable Forrest H. Anderson
Governor of the State of Montana
Helena, Montana

Honorable William L. Guy
Governor of the State of North Dakota
Bismarck, North Dakota

Sirs:

Pursuant to Article III of the Yellowstone River Compact, the Commission makes the following nineteenth annual report of activities for the period ending September 30, 1970.

The Commission met at Billings, Montana on November 9, 1970, for its nineteenth annual meeting. Mr. Floyd A. Bishop, Wyoming State Engineer, and Mr. Douglas G. Smith, Director, Montana Water Resources Board, the designated representatives of their respective states, were present. Mr. Harlan M. Erskine, Federal representative, who died January 31, 1970, was replaced by Mr. Robert C. Williams, the new designated Federal representative. Others present were Messrs. Phil Q. Gibbs and Clarence R. Beitman, U.S. Bureau of Reclamation, Billings, Montana; Everett Redeen, Montana Water Resources Board, Forsyth, Montana; Fred C. Boner, U.S. Geological Survey, Cheyenne, Wyoming; and George Pike, U.S. Geological Survey, Helena, Montana.

During the year ending September 30, 1970, annual streamflow at the designated points of measurement in Montana was near or above normal, and occurred in a near-ideal manner. Flow at the Compact points of measurement ranged from 107 to 163 percent of the 1953-67 averages. Reservoir storage was high at the beginning of the season and water supplies were generally adequate. Precipitation was generally below normal during the growing season, but water supplies in areas without sufficient storage were generally adequate to meet the needs because of prolonged runoff caused by above-normal snowpack and low temperatures during the spring and early summer.

There were no developments during the year that required allocations of water in accordance with the provisions of the Compact. The state Commissioners are of the opinion that the present level of water-resources development does not warrant a program of intensive water-use regulations to comply with Compact allocation provisions.

Interest of major energy companies in obtaining large quantities of water to develop the coal resources in Wyoming and Montana remains high. The Bureau of Reclamation reports the organization of the North Central Power Study, which has representation from governmental agencies and 35 power companies. Pipeline surveys reported by the Bureau of Reclamation last year have advanced to the point where estimates of the cost of water delivered through two of the pipelines are available. Initial estimates call for a million acre-feet of water through the pipelines. The Commission has demonstrated much interest in these studies and plans to stay abreast of developments.

Another item that is of concern to the Commission is the uncertainty connected with the claims to the water rights of water flowing through Indian reservations. The allocation of waters under terms of the Compact could be affected considerably depending on the settlement of these claims. Recently, the Salish-Kootenai Confederated Tribe engaged a Utah consulting firm to prepare an inventory of the water resources of the Flathead Indian Reservation. The inventory will include studies of the present water resources and needs of the reservation, and will project future needs and uses of the resources within the reservation. It appears that similar studies will have to be made for the other reservations in order to determine how much water is involved in these claims.

The Commission recommends that stream-gaging activities in the basin should continue to be expanded so that more adequate basic data will be available when the point in time is reached when regulation of water use must be initiated to comply with the terms of the Compact. Funds to accomplish this will be reflected in future budget recommendations.

For the fiscal year beginning July 1, 1970, the budget is $16,000, which provides for the continuation of the existing

program and the establishment of a Compact gaging station on Prairie Dog Creek near Acme. This installation has been completed. A budget of $15,200 is planned for the fiscal year beginning July 1, 1971, which will provide for continuation of the existing program and installation and operation of one new gaging station.

Respectfully submitted,

Floyd A. Bishop
Commissioner for Wyoming

Douglas G. Smith
Commissioner for Montana

Robert C. Williams
Federal Representative

GENERAL REPORT

Cost:

The work of the Commission, which to date has been primarily concerned with the collection of required hydrologic data, has been financed through cooperative arrangements whereby Montana and Wyoming each bear one-fourth of the cost and the remaining one-half is borne by the United States. The salaries and necessary expenses of the State and Federal representatives and hydrologic data made available by other agencies are not evaluated or considered as expense of the Commission.

The expense of the Commission during the fiscal year ending June 30, 1970, was $12,700, in accordance with the budget adopted for that year.

The budgets for the fiscal years ending June 30, 1971, and June 30, 1972, were tentatively adopted during the preceding year subject to the availability of appropriations. The 1971 fiscal year budget was confirmed at the 1970 annual meeting.

The budgets for the two fiscal years are summarized as follows:

July 1, 1970, to June 30, 1971:

Continuation of existing program	$ 9,500
Installation of new recording gaging station on Prairie Dog Creek	5,000
Operation of Prairie Dog Creek station	1,500
Total	$16,000

July 1, 1971, to June 30, 1972:

Continuation of existing program	$11,770
Installation of a new gaging station, location of which is to be determined	1,930
Operation of new station	1,500
Total	$15,200

Gaging Stations:

During the summer of 1970, a gaging station on Prairie Dog Creek was established. The name of the new station is Prairie Dog Creek near Acme, Wyoming.

Gaging stations at the sites specified in the Rules and Regulations were continued in operation and satisfactory discharge records collected at each.

Streamflow at the designated sites was near the long-term average, except for the Tongue River where flows were appreciably higher due to heavy snowpack in the basin. Annual flows ranged from 107 to 163 percent of the 1953-67 average at the four key stations.

Details of streamflow and bar-graph comparisons with average flows during selected base periods and with the preceding year are given in Appendix B.

Diversions:

Opinions expressed by the two State representatives indicated that allocable diversions in Montana and Wyoming initiated since January 1, 1950, did not warrant detailed consideration and that use in the upstream State did not exceed Compact allowances.

Energy companies continued to express a strong interest in obtaining large quantities of water from the Bighorn and Tongue Rivers, in particular, for industrial use in connection with proposed plants to be located in the coal fields in Montana and Wyoming. No additional options or firm arrangements for furnishing such water were reported during the year, but negotiations are continuing.

The Bureau of Reclamation reported some progress on the pipeline surveys and cost estimates that were started a year ago. The estimates of cost of moving water from the Bighorn River to the Gillette, Wyoming area and from the Yellowstone River to the Colstrip, Montana area have been completed. Estimates indicate that the cost of water per acre-foot from the pipelines will be about $99 at Gillette and about $45 at Colstrip.

Factual information regarding consumptive use of water and return flows from irrigation, as practiced in the basins of major tributaries of the Yellowstone River, is very limited. The Commission believes that information of this type and its proper application will be extremely important in the future development of the basin as demands for water increase and allocations under the Compact must be made. Efforts to obtain approval and funding for studies on consumptive use and return flows in representative areas in the basin will continue.

Storage:

In reservoirs completed after January 1, 1950

Bighorn Lake, a Bureau of Reclamation project on the Bighorn River, and the largest storage project in the basin, contained 867,100 acre-feet at the beginning of the year and 1,051,000 acre-feet at the close. It fluctuated from a minimum of 660,700 acre-feet on March 11, 1970, to a maximum of 1,160,000 acre-feet on July 1, 1970. Boysen Reservoir, located on Wind River and operated by Bureau of Reclamation, began the year with 674,100 acre-feet in storage and ended with 603,200 acre-feet. Details regarding these reservoirs are given in Appendix C. The Commission is cognizant of other reservoirs in this general group and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

In reservoirs existing on January 1, 1950

Storage pertinent to Compact allocation in these reservoirs is confined to usage for new developments completed after January 1, 1950. This is currently considered very minor. Month-end storage data for these reservoirs are given in Appendix D as a matter of record and general information on water supply.

RULES AND REGULATIONS FOR ADMINISTRATION OF THE YELLOWSTONE RIVER COMPACT

A compact, known as the Yellowstone River Compact, between the States of Wyoming, Montana and North Dakota, having become effective on October 30, 1951 upon approval of the Congress of the United States, which apportions the waters of certain interstate tributaries of the Yellowstone River which are available after the appropriative rights existing in the States of Wyoming and Montana on January 1, 1950 are supplied, and after appropriative rights to the use of necessary supplemental water are also supplied as specified in the Compact, the following rules and regulations are adopted subject to the provisions for amendment, revision or abrogation as provided herein.

Article I. Collection of Water Records

A. It shall be the joint and equal responsibility of the members of the states of Wyoming and Montana to collect, cause to be collected or otherwise furnish records of tributary stream flow at the points of measurement specified in Article V (B) of the Compact, or as near thereto as is physically or economically feasible or justified.

1. Clarks Fork

The gaging station known as Clarks Fork near Silesia, Montana and located in NE 1/4 SE 1/4 sec.1, T.4 S., R.23 E., shall be the point of measurement for the Clarks Fork.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River at Bighorn, Montana and located in NE 1/4 NE 1/4 sec. 33, T.5 N., R.34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana, and located in NE 1/4 NE 1/4 sec.19, T.1 S., R.34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana and located in SE 1/4, sec.23, T.7 N., R.47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River near Locate, Montana and located in SW 1/4 sec.14, T.8 N., R.51 E., shall temporarily be the designated point of measurement for that stream.

B. Records of total annual diversion in acre-feet above the points of measurement designated in the Compact for irrigation, municipal and industrial uses developed after January 1, 1950, shall be furnished by the members of the Commission for their respective states, at such time as the Commission deems necessary for interstate administration as provided by the terms of the Compact. Providing that if it be acceptable to the Commission, reasonable estimates thereof may be substituted.

C. Annual records of the net change in storage in all reservoirs, not excluded under Article V (E) of the Compact, above the point of measurement specified in the Compact and completed after January 1, 1950, and the annual net change in reservoirs existing prior to January 1, 1950, which is used for irrigation, municipal and industrial purposes developed after January 1, 1950, shall be the primary responsibility of the member of the Commission in whose state such works are located; providing such data is not furnished by federal agencies under the provisions of Article III (D) of the Compact, or collected by the Commission.

Article II. Office and Officers

A. The office of the Commission shall be located, and be that of the United States Geological Survey, in Helena, Montana.

B. The Chairman of the Commission shall be the federal representative as provided in the Compact.

C. The Secretary of the Commission shall be as provided for in Article III of these rules.

D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U.S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:

1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.

2. Assemble factual information on stream flow, diversion and reservoir storage for the preparation of an annual report to the Governors of the signatory states.

3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.

B. Act as Secretary to the Commission.

Article IV. Budget

A. At the annual meeting of each even numbered year or prior thereto, the Commission shall adopt a budget for operation during the ensuing biennium beginning July first. Such budget shall set forth the total cost of construction, maintenance and operation of gaging stations, the cost of engineering and clerical aid, and other necessary expenses excepting the salaries and personal expenses of the Commissioners. On odd-numbered years revisions of the budget shall be considered.

B. It shall be the obligation of the Commissioners of the states of Montana and Wyoming to endeavor to secure from the Legislature of their respective states sufficient funds with which to meet the obligations of this Compact, except insofar as provided by the federal government.

Article V. Meetings

An annual meeting of the Commission shall be held each November at some mutually agreeable point in the Yellowstone River basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction of such other business consistent with its authority; provided that by unanimous consent of the Commission the

date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approval by the Commissioners for the States of Wyoming and Montana.

Article VI. Amendments, Revisions and Abrogations.

The Rules and Regulations of the Commission may be amended or revised by a unanimous vote at any meeting of the Commission.

Douglas G. Smith
Commissioner for Montana

Floyd A. Bishop
Commissioner for Wyoming

ATTESTED:

Robert C. Williams
Federal Representative

Adopted November 17, 1953
Amended November 9, 1970

MONTHLY SUMMARY OF DISCHARGE
Clarks Fork Yellowstone River near Silesia, Montana

LOCATION.--Lat 45°30'48", long 108°49'41", in NE 1/4 SE 1/4 sec.1, T.4 S., R.23 E., Carbon County, on left bank 0.5 mile downstream from Whitehorse Canal intake, 1 mile upstream from Rock Creek, and 3 miles south of Silesia.

DRAINAGE AREA.--2,093 sq mi.

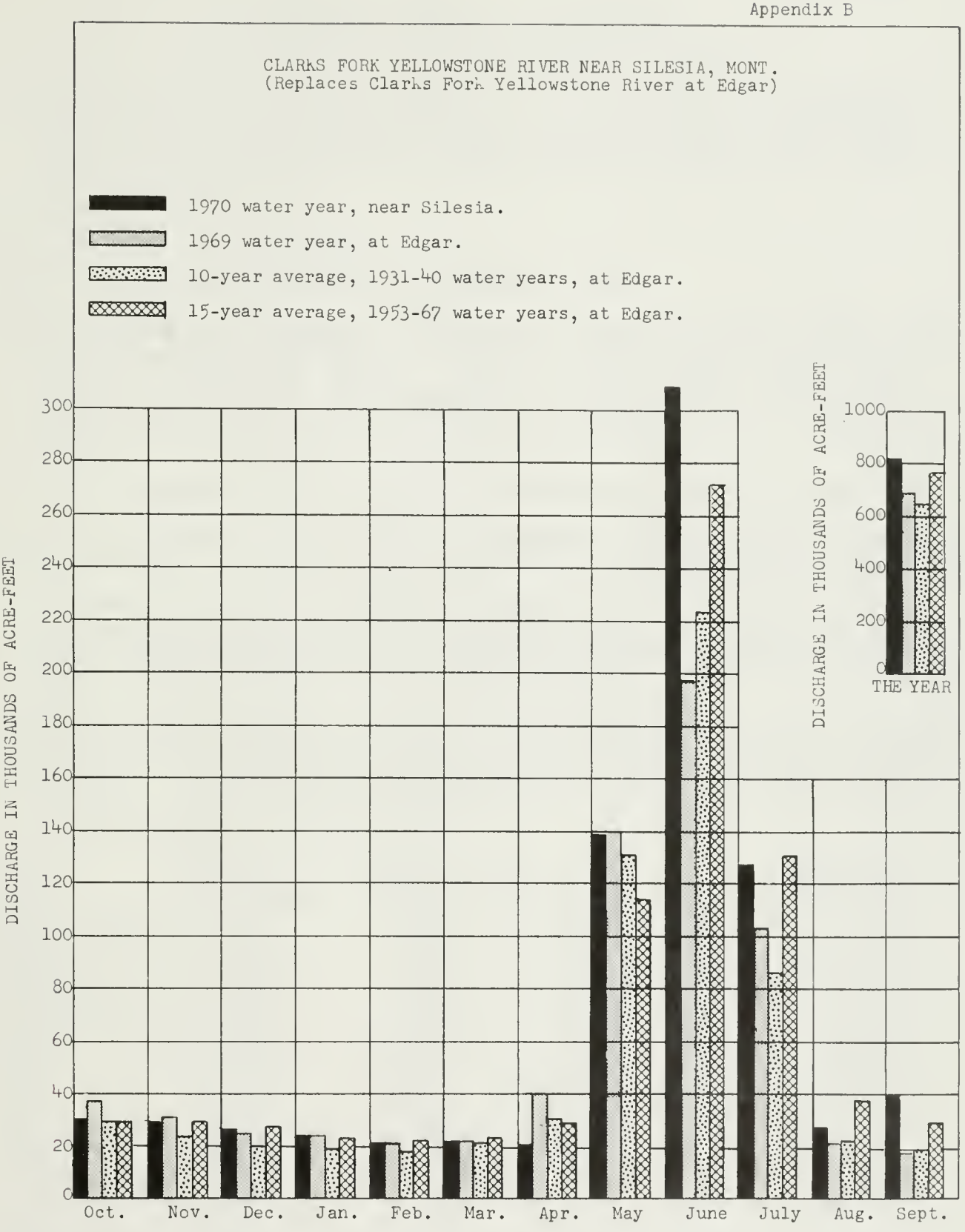
PERIOD OF RECORD.--October 1969 to September 1970. Records for July 1921 to September 1969 (published as Clarks Fork Yellowstone River at Edgar) at site 5 miles upstream not equivalent owing to diversion in Whitehorse Canal during irrigation season.

GAGE.--Water-stage recorder. Altitude of gage is 3,410 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 8,820 cfs June 25 (gage height, 6.64 ft); minimum, 165 cfs Aug. 27, 28 (gage height, 1.38 ft).

REMARKS.--Records good except those for winter period, which are poor. Diversions for irrigation of about 42,600 acres of which 1,100 acres lies below station. In addition, about 9,000 acres of land above station are irrigated by diversions from the adjoining Rock Creek basin.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in acre-feet
October 1969	15,354	554	427	495	30,450
November	14,925	541	420	498	29,600
December	13,562	528	330	437	26,900
January 1970	11,930	500	200	385	23,660
February	11,180	480	361	399	22,180
March	10,797	379	321	348	21,420
April	10,534	458	302	351	20,890
May	70,063	6,040	397	2,260	139,000
June	155,910	8,040	2,560	5,197	309,200
July	64,380	4,260	1,020	2,077	127,700
August	13,594	1,060	175	439	26,960
September 1970	20,211	920	228	674	40,090
Water year 1969-70	412,440	8,040	175	1,130	818,100



Comparison of discharge during 1970 water year near Silesia with 1968 water year at Edgar and with average discharge for the water years 1931-40 and 1953-67 at Edgar.

MONTHLY SUMMARY OF DISCHARGE
Little Bighorn River near Hardin, Montana

LOCATION.--Lat 45°44'08", long 107°33'27", in NE 1/4 NE 1/4 sec.19, T.1 S., R.34 E., Big Horn County, on left bank 50 ft downstream from bridge on Sarpy Road, 0.2 mile upstream from terminal wasteway of Agency Canal, 0.6 mile upstream from mouth, and 2.3 miles east of Hardin.

DRAINAGE AREA.--1,294 sq mi.

PERIOD OF RECORD.--June 1953 to September 1970.

GAGE.--Water-stage recorder. Altitude of gage is 2,890 ft (from topographic map). Prior to Oct. 7, 1953, nonrecording gage at site 0.4 mile downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mile downstream. May 6, 1963, to Nov. 6, 1963, nonrecording gage at site 0.4 mile downstream. All at different datums.

AVERAGE DISCHARGE.--17 years, 273 cfs (197,800 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,590 cfs May 24; maximum gage height, 5.42 ft May 10; minimum daily discharge, 110 cfs Jan. 30.

Period of record: Maximum discharge, 4,520 cfs Apr. 2, 1965; maximum gage height, 11.78 ft Mar. 20, 1960, site and datum then in use (backwater from ice); minimum discharge observed, 0.20 cfs Aug. 7, 1961, result of discharge measurement.

REMARKS.--Records good except those for winter period, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity, 23,000 acre-ft). Diversions for irrigation of about 17,000 acres above station. Figures of discharge given herein include flow of terminal wasteway of Agency Canal.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in acre-feet
October 1969	5,630	215	146	182	11,170
November	5,573	215	160	186	11,050
December	5,090	200	130	164	10,100
January 1970	4,560	190	110	147	9,040
February	5,545	300	130	198	11,000
March	14,235	1,210	205	459	28,240
April	19,081	1,730	316	636	37,850
May	43,755	2,390	530	1,411	86,790
June	55,710	2,260	1,480	1,857	110,500
July	17,142	1,480	239	553	34,000
August	6,656	238	184	215	13,200
September 1970	7,665	332	214	256	15,200
Water year 1969-70	190,642	2,390	110	522	378,100

MONTHLY SUMMARY OF DISCHARGE
Bighorn River at Bighorn, Montana

LOCATION.--Lat 46°08'50", long 107°28'00", in NE 1/4 NE 1/4 sec.33, T.5 N., R.34 E., Treasure County, on right bank just downstream from bridge on old U.S. Highway 10, 0.3 mile downstream from bridge on Interstate Highway 94, 0.7 mile upstream from mouth, 1.3 mile southwest of Bighorn, and 4.4 miles east of Custer.

DRAINAGE AREA.--22,885 sq mi. At site used prior to Oct. 7, 1955, 22,410 sq mi.

PERIOD OF RECORD.--May 1945 to September 1970. Published as "near Custer," 1945-55. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,690 ft (by barometer). May 11 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder, at site 4 miles upstream at different datum.

AVERAGE DISCHARGE.--25 years, 3,756 cfs (2,721,000 acre-ft per year), unadjusted.

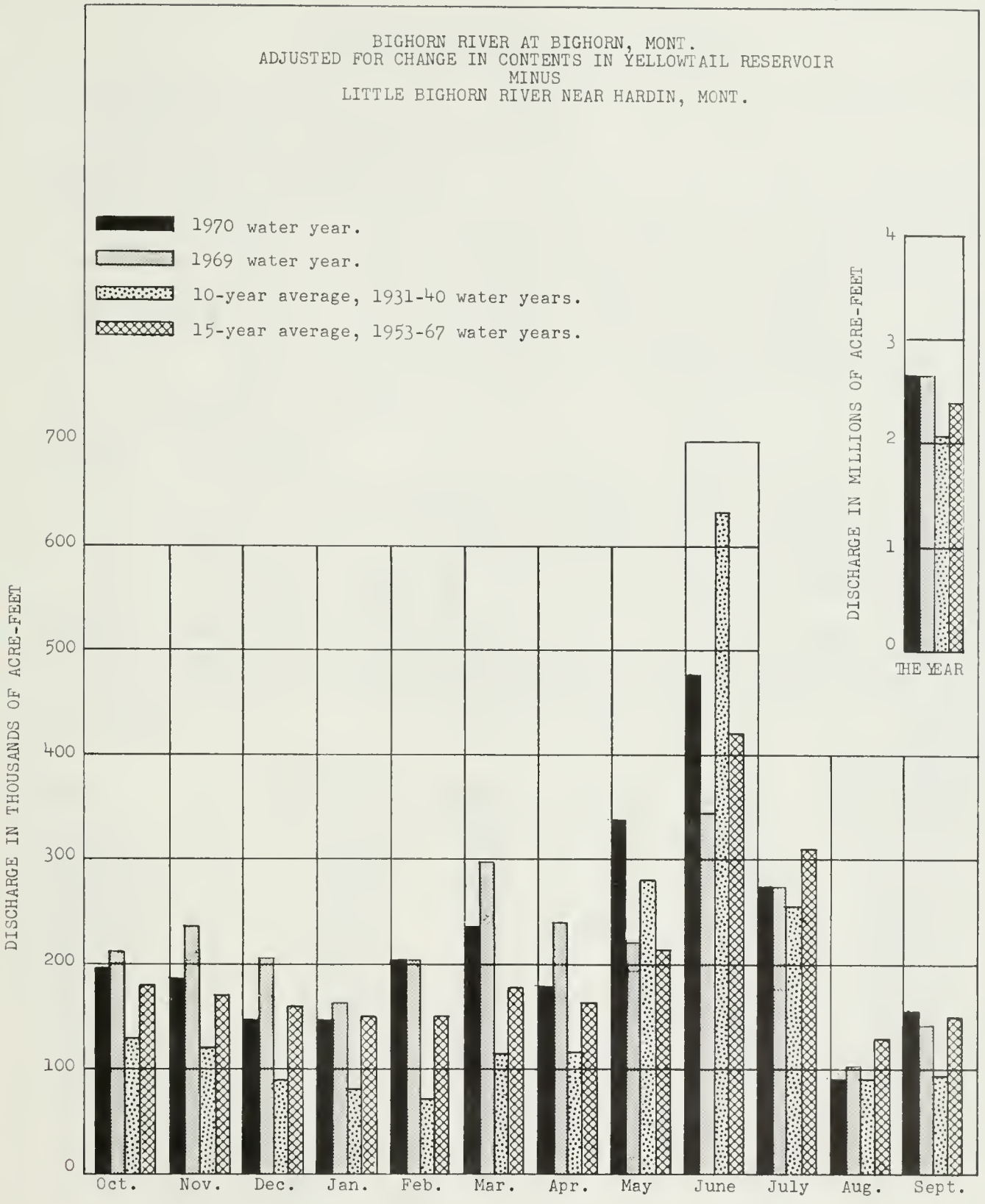
EXTREMES.--Current year: Maximum discharge, 15,200 cfs July 3 (gage height, 7.03 ft); minimum daily, 1,020 cfs Oct. 8.

Period of record: Maximum discharge, 26,200 cfs June 24, 1947 (gage height, 8.79 ft, site and datum then in use), from rating curve extended above 12,500 cfs by logarithmic plotting; maximum gage height recorded, 14.21 ft Apr. 2, 1965; minimum discharge, about 275 cfs Nov. 15, 1959, result of freezeup; minimum daily, 400 cfs Apr. 4, 1967.

REMARKS.--Records good except those for period of backwater from Yellowstone River, which are poor. Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft (see Appendices C and D). Diversions for irrigation of about 465,000 acres above station.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in acre-feet	Adjusted runoff in acre-feet*
Oct. 1969	107,860	4,160	1,020	3,479	213,900	210,400
Nov.	97,870	4,030	2,570	3,262	194,100	199,200
Dec.	119,400	4,160	3,050	3,852	236,800	158,900
Jan. 1970	128,040	4,750	3,900	4,130	254,000	156,400
Feb.	117,870	5,170	3,800	4,210	233,800	217,500
Mar.	93,690	5,520	1,250	3,022	185,800	266,000
Apr.	63,130	3,220	1,060	2,104	125,200	218,800
May	142,150	6,700	2,720	4,585	282,000	425,700
June	214,610	12,600	5,370	7,154	425,700	589,300
July	214,730	15,100	3,160	6,927	425,900	312,900
Aug.	72,140	3,560	1,820	2,327	143,100	106,100
Sept. 1970	65,680	2,590	2,030	2,189	130,300	173,300
Water year 1969-70	1,437,170	15,100	1,020	3,937	2,851,000	3,034,900

* Adjusted for change in contents in Bighorn Lake.

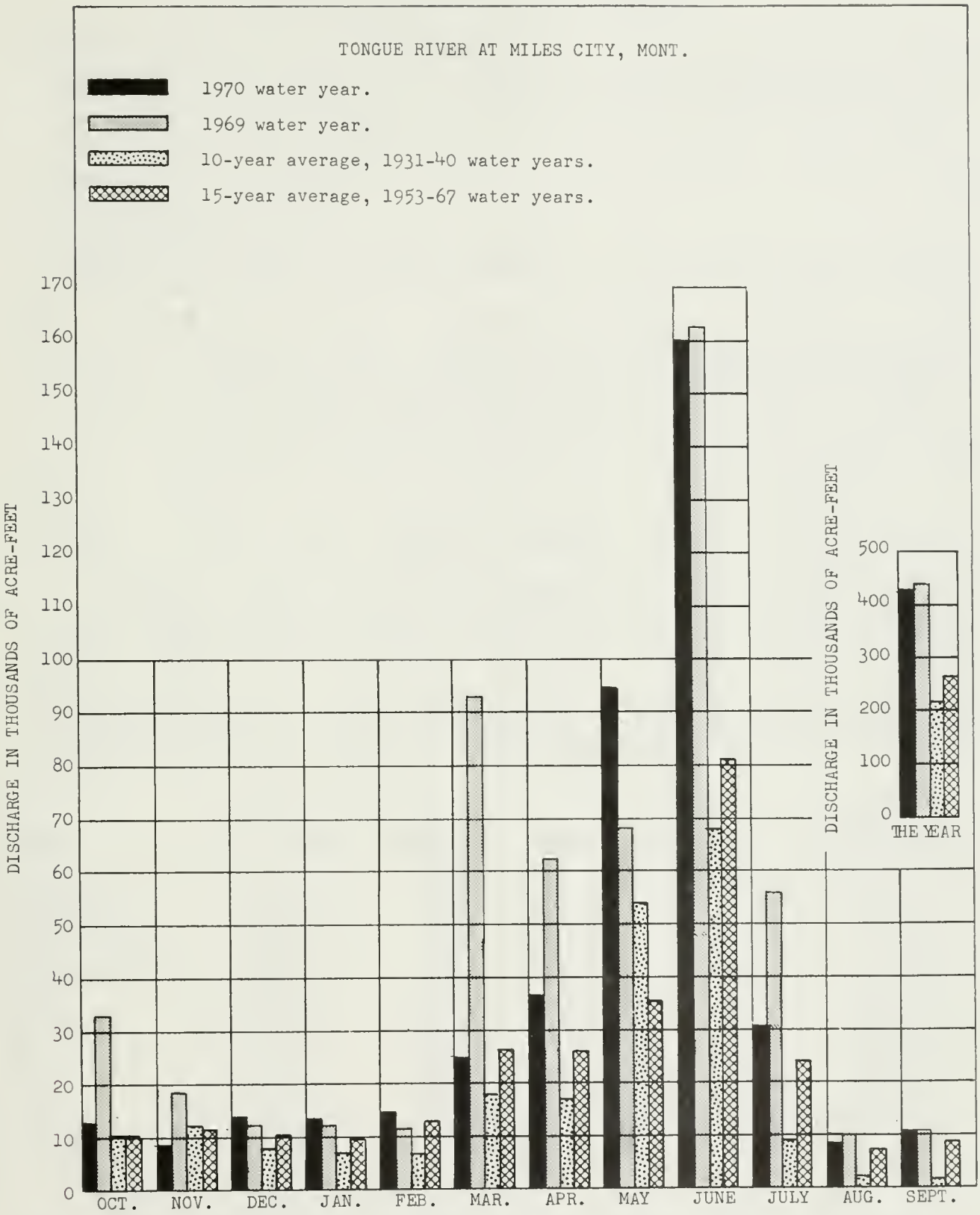


Comparison of discharge during 1970 water year with 1969 water year and with average discharge for water years 1931-40 and 1953-67.

MONTHLY SUMMARY OF DISCHARGE
Tongue River at Miles City, Montana

LOCATION.--Lat 46°21'30", long 105°48'24", in SE 1/4 sec.23, T.7 N., R.47 E., Custer County, on right bank 4 miles south of Miles City and 8 miles upstream from mouth.
DRAINAGE AREA.--5,379 sq mi.
PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to September 1970. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharge only for some periods, published in WSP 1309. Records since January 1950 available in annual report of Yellowstone River Compact Commission.
GAGE.--Water-stage recorder. Altitude of gage is 2,370 ft (by barometer). April 1938 to April 1942, nonrecording gage at site 8 miles upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft higher.
AVERAGE DISCHARGE.--27 years (1938-41, 1946-70), 405 cfs (293,400 acre-ft per year).
EXTREMES.--Current year: Maximum discharge, 3,430 cfs June 1 (gage height, 6.49 ft); minimum daily discharge, 70 cfs Nov. 19.
Period of record: Maximum discharge, 13,300 cfs June 15, 1962 (gage height, 12.33 ft, present datum), from rating curve extended above 5,200 cfs on basis of float measurement; maximum gage height, 13.27 ft (present datum) Mar. 19, 1960 (ice jam); no flow July 9-19, Aug. 13, 14, Sept. 28, 1940.
REMARKS.--Records good except those for winter period, which are poor. Flow regulated by Tongue River Reservoir (Appendix C) and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft). Diversions for irrigation of about 90,000 acres above station.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in acre-feet
October 1969	6,271	336	138	202	12,440
November	4,269	209	70	142	8,470
December	6,920	350	110	223	13,730
January 1970	6,670	300	140	215	13,230
February	7,360	400	200	263	14,600
March	12,570	540	260	405	24,930
April	17,982	924	510	599	35,670
May	47,607	3,330	590	1,536	94,430
June	80,670	3,420	1,760	2,689	160,000
July	15,626	1,630	234	504	30,990
August	4,283	258	88	138	8,500
September 1970	6,282	279	113	209	12,460
Water year 1969-70	216,510	3,420	70	593	429,400



Comparison of discharge during 1970 water year with 1969 water year and with average discharge for water years 1931-40 and 1953-67.

MONTHLY SUMMARY OF DISCHARGE
Powder River near Locate, Montana

LOCATION.--Lat 46°27'00", long 105°19'00", in SW 1/4 sec.14, T.8 N., R.51 E., Custer County, on left bank 1.5 miles downstream from bridge on U.S. Highway 12 at present site of Locate (5 miles west of former site of Locate), 1.5 miles upstream from Locate Creek, and 25 miles east of Miles City.

DRAINAGE AREA.--13,194 sq mi. Area at site used prior to Oct. 1, 1965, 13,189 sq mi.

PERIOD OF RECORD.--March 1938 to September 1970. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Altitude of gage is 2,390 feet (by barometer). Prior to July 11, 1947, nonrecording gage at bridge 1.5 miles upstream and July 11, 1947, to Sept. 30, 1965, water-stage recorder at sites near bridge at different datum. Oct. 1, 1965, to Oct. 4, 1966, nonrecording gage, and Oct. 5, 1966, to Apr. 15, 1969, water-stage recorder at site 200 ft upstream at present datum.

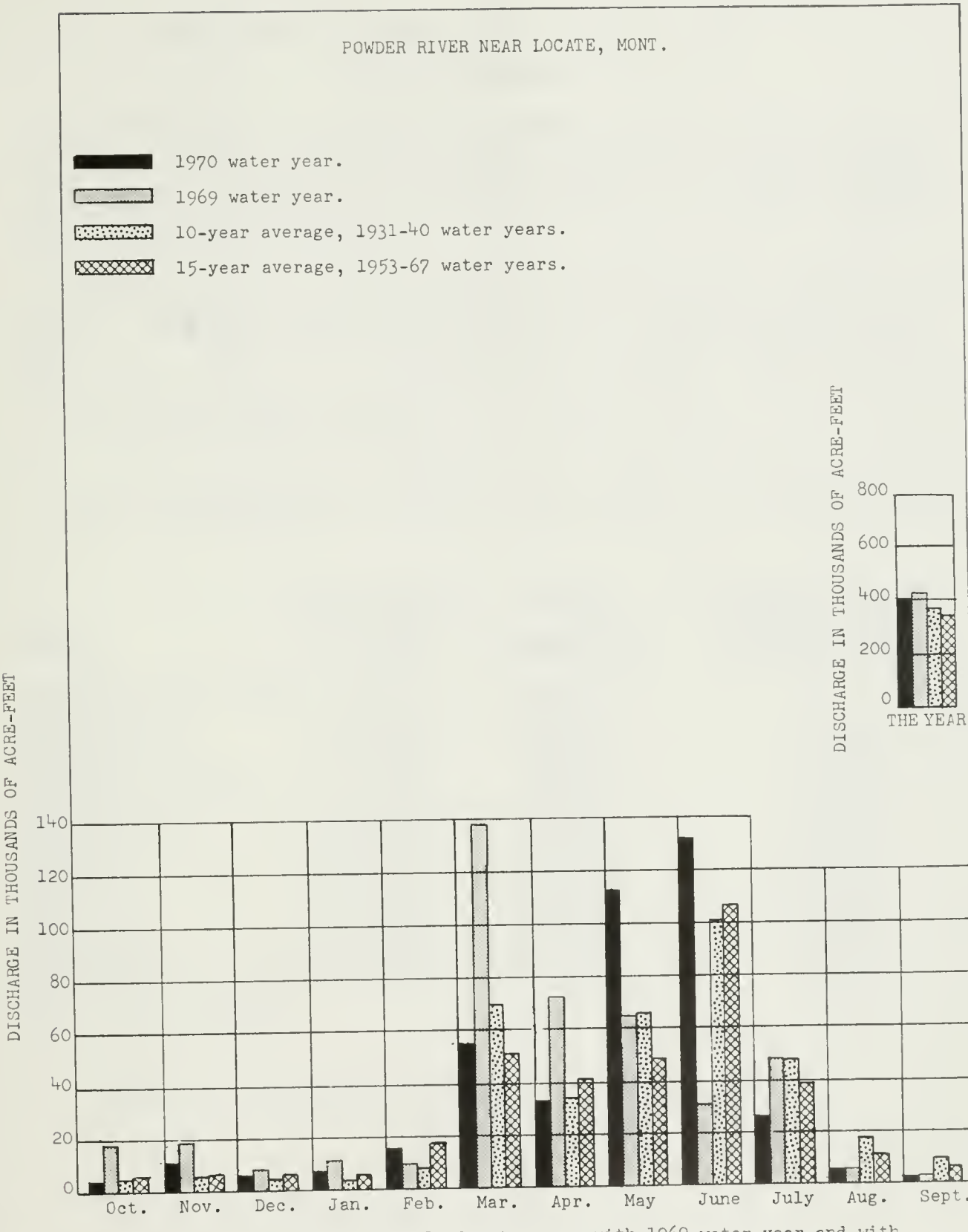
AVERAGE DISCHARGE.--32 years, 600 cfs (434,700 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 8,450 cfs May 25 (gage height, 7.0 ft, from floodmark); minimum observed, 4.3 cfs Sept. 13.

Period of record: Maximum discharge observed, 31,000 cfs Feb. 19, 1943 (gage height, 11.23 ft, site and datum then in use), from rating curve extended above 17,000 cfs; no flow Jan. 16 to Feb. 12, Feb. 22-24, 1950, July 27, Sept. 21-27, Oct. 1, 1960, Sept. 4-8, 1961.

REMARKS.--Records good except those for winter period, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft. Diversions for irrigation of about 52,000 acres above station.

Month	Second-foot days	Maximum	Minimum	Mean	Runoff in acre-feet
October 1969	2,068	182	11	66.7	4,100
November	5,774	280	70	192	11,450
December	3,000	170	50	96.8	5,950
January 1970	3,650	160	80	118	7,240
February	7,510	730	130	268	14,900
March	28,050	2,300	540	905	55,640
April	16,737	861	432	558	33,200
May	57,028	5,860	425	1,840	113,100
June	66,910	4,010	1,230	2,230	132,700
July	12,833	1,200	81	414	25,450
August	894.8	93	5.2	28.9	1,770
September 1970	333.8	30	4.3	11.1	662
Water year 1969-70	204,788.6	5,860	4.3	561	406,200



Comparison of discharge for 1970 water year with 1969 water year and with average discharge for water years 1931-40 and 1953-67.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

BOYSEN RESERVOIR

Water-stage recorder at dam on Wind River, 13 miles north of Shoshoni, Wyoming. Reservoir formed by earth-fill dam, construction of which began in 1947. Storage began Oct. 11, 1951. Dead storage, 59,880 acre-ft at elevation 4,657.0 ft. Usable contents, 742,100 acre-ft at elevation 4,725.0 ft (top of gates). Crest of dam at elevation, 4,758 ft.

Records given herein represent usable contents. Water is used for irrigation and power development. Allocation for flood control provided. Data furnished by U. S. Bureau of Reclamation.

EXTREMES.--Current year: Maximum usable contents, 674,100 acre-ft Oct. 1 (elevation, 4,721.41 ft); minimum, 359,400 acre-ft May 6 (elevation, 4,700.88 ft).

Period of record: Maximum usable contents, 862,700 acre-ft July 7, 1967; minimum, 189,800 acre-ft Mar. 18, 19, 1956 (elevation, 4,684.18 ft).

Month	Water-surface elevation in feet	Contents in acre-feet*	Change in contents during month in acre-feet
September 30, 1969	4,721.41	674,100	--
October 31	4,720.46	656,800	- 17,300
November 30	4,718.35	619,300	- 37,500
December 31	4,716.65	590,100	- 29,200
January 31, 1970	4,714.53	555,100	- 35,000
February 28	4,710.28	489,100	- 66,000
March 31	4,704.94	412,600	- 76,500
April 30	4,701.36	365,500	- 47,100
May 31	4,705.73	423,400	+ 57,900
June 30	4,718.30	618,400	+ 195,000
July 31	4,719.55	640,500	+ 22,100
August 31	4,718.22	617,000	- 23,500
September 30, 1970	4,717.42	603,200	- 13,800
Water year 1969-70			- 70,900

* Does not include dead storage of 59,880 acre-ft.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

ANCHOR RESERVOIR

Water-stage recorder at dam on South Fork Owl Creek, 32 miles west of Thermopolis, Wyoming. Reservoir formed by thin concrete arch dam, construction of which began in 1957. Closure of dam made Nov. 21, 1960. Temporary outlet at elevation 6,304.30 ft still in use. Lowest permanent outlet sill at elevation 6,343.75 ft (contents, 149 acre-feet). Total contents, 17,350 acre-feet at upper active capacity level of 6,441 ft. Crest of dam at elevation 6,452.5 ft.

Records given in this report are total contents. Data furnished by U.S. Bureau of Reclamation.

Month	Water-surface elevation in feet	Contents in acre-feet*	Change in contents during month in acre-feet
September 30, 1969	6,304.30	0	-
October 31	6,304.30	0	0
November 30	6,304.30	0	0
December 31	6,304.30	0	0
January 31, 1970	6,304.30	0	0
February 28	6,304.30	0	0
March 31	6,304.30	0	0
April 30	6,304.30	0	0
May 31	6,361.59	621	+ 621
June 30	6,384.11	2,370	+ 1,749
July 31	6,304.30	0	- 2,370
August 31	6,304.30	0	0
September 30, 1970	6,304.30	0	0

Water year 1969-70

* Includes dead storage.

RESERVOIRS COMPLETED AFTER JANUARY 1, 1950

BIGHORN LAKE
(Formerly published as Yellowtail Reservoir)

Water-stage recorder at dam on Bighorn River, 15.5 miles southwest of St. Xavier, Montana. Reservoir formed by thin concrete-arch dam, construction of which began in 1961. Storage began Nov. 3, 1965. Dead storage, 18,970 acre-ft at elevation 3,296.5 ft. Usable contents, 1;356,000 acre-ft at elevation 3,657.0 ft. Crest of dam at elevation 3,660.0 ft.

Records given herein represent usable contents. Water is used for irrigation, power development and recreation. Allocation for flood control provided. Data furnished by U. S. Bureau of Reclamation.

EXTREMES.--Current year: Maximum daily contents, 1,160,000 acre-ft July 1 (elevation, 3,644.65 ft); minimum, 660,700 acre-ft Mar. 11 (elevation, 3,584.45 ft).

Period of record: Maximum contents, 1,346,000 acre-ft July 6, 1967 (elevation, 3,656.43 ft); minimum since first filling, 660,700 acre-ft Mar. 11, 1970 (elevation, 3,584.45 ft).

Month	Water-surface elevation in feet	Contents in acre-feet*	Change in contents during month in acre-feet
September 30, 1969	3,616.19	867,100	--
October 31	3,615.78	863,600	- 3,500
November 30	3,616.38	868,700	+ 5,100
December 31	3,605.75	790,800	- 77,900
January 31, 1970	3,590.26	693,200	- 97,600
February 28	3,587.39	676,900	- 16,300
March 31	3,600.71	757,100	+ 80,200
April 30	3,614.38	850,700	+ 93,600
May 31	3,630.97	994,400	+ 143,700
June 30	3,644.49	1,158,000	+ 163,600
July 31	3,635.64	1,045,000	- 113,000
August 31	3,632.31	1,008,000	- 37,000
September 30, 1970	3,636.18	1,051,000	+ 43,000
Water year 1969-70			+ 183,900

* Does not include dead storage of 18,970 acre-feet.

RESERVOIRS IN EXISTENCE ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this category which may be subject to Compact allocations was not determined. As a matter of hydrologic interest, the monthend contents in acre-feet of four reservoirs are given. The first three reservoirs are in the Bighorn River basin, Wyoming and data on contents were furnished by the U.S. Bureau of Reclamation. Tongue River Reservoir in Montana is operated under the supervision of the Montana Water Resources Board, which agency furnished operating data.

Contents in acre-feet

Month	a/Bull Lake	b/Pilot Butte Reservoir	c/Buffalo Bill Reservoir	d/Tongue River Reservoir
September 30, 1969	65,010	16,130	251,600	21,200
October 31	59,280	13,560	221,200	27,400
November 30	60,750	15,930	215,200	32,800
December 31	60,340	16,400	208,200	30,000
January 31, 1970	58,940	18,500	200,800	27,400
February 28	58,600	20,230	188,500	32,800
March 31	59,320	28,340	172,800	37,850
April 30	59,610	29,660	148,40C	35,400
May 31	81,740	28,260	268,700	44,400
June 30	145,000	29,390	447,100	53,160
July 31	145,400	25,500	417,600	48,500
August 31	113,300	13,430	336,300	32,800
September 30, 1970	105,400	10,840	291,000	27,400
Change in Contents during water year	+ 40,390	- 5,290	+ 39,400	+ 6,200

a/ Total contents, from revised capacity table effective Oct. 1, 1965.

b/ Usable contents. Dead storage is 5,360 acre-feet.

c/ Total contents, from revised capacity table based on survey of 1959. Contents prior to October 1960 based on survey of 1941.

d/ Usable contents. Dead storage is 1,400 acre-feet. Contents based upon sedimentation surveys of October 1948.

LOCATION MAP

STONE RIVER COMPACT COMMISSION

WSTONE RIVER BASIN

LEGEND

▲ COMPACT STREAM GAGING STATIONS
◧ RESERVOIR CONTENT STATIONS

YELLOWSTONE RIVER COMPACT COMMISSION

YELLOWSTONE RIVER BASIN

LEGEND

▲ COMPACT STREAM GAGING STATIONS
◧ RESERVOIR CONTENT STATIONS